

Detection of multiple fish species in the diet of the invasive round goby reveals new trophic interactions in the Baltic Sea

SND-ID: 2023-73-1. **Version:** 1. **DOI:** <https://doi.org/10.5878/m5m1-br15>

Download data

code_fish_diet_log.txt (1.73 MB)

data_ttest_BMI_AL_1819_csv_1.csv (1.65 KB)

data_ttest_BMI_KK_1819_csv_1.csv (1.16 KB)

data_ttest_fish_KK_1819_csv_1.csv (804 bytes)

data_ttest_rg_median_catch_1819_rev_csv_1.csv (507 bytes)

Diet_data_RG_no_zoopl_200520_csv_1.csv (46.98 KB)

DNA_seq_vs_rg_catch_csv_1.csv (5.42 KB)

rg_dna_comparison_VSCA_COI_csv_1.csv (536 bytes)

RG_DNA_metabarcoding_12S_2018_2019_csv_1.csv (11.54 KB)

RG_DNA_metabarcoding_FO_csv_1.csv (6.75 KB)

Rplots.pdf (138.09 KB)

VSCA_preym_abund_vs_rg_catch_csv_1.csv (403.3 KB)

Associated documentation

code_fish_diet_sessionInfo.txt (2.77 KB)

code_fish_diet.R (48.84 KB)

Metadata_1_Diet_data_RG_no_zoopl_200520.tsv (3.83 KB)

Metadata_10_data_ttest_rg_median_catch_1819_rev.tsv (452 bytes)

Metadata_2_rg_dna_comparison_VSCA_COI.tsv (554 bytes)

Metadata_3_RG_DNA_metabarcoding_12S_2018_2019.tsv (1.76 KB)

Metadata_4_RG_DNA_metabarcoding_FO.tsv (897 bytes)

Metadata_5_DNA_seq_vs_rg_catch.tsv (942 bytes)

Metadata_6_VSCA_preym_abund_vs_rg_catch.tsv (1.03 KB)

Metadata_7_data_ttest_fish_KK_1819.tsv (247 bytes)

Metadata_8_data_ttest_BMI_KK_1819.tsv (285 bytes)

Metadata_9_data_ttest_BMI_AL_1819.tsv (281 bytes)

Download all files

2023-73-1-1.zip (~2.39 MB)

Citation

Wallin Kihlberg, I. (2023) Detection of multiple fish species in the diet of the invasive round goby reveals new trophic interactions in the Baltic Sea (Version 1) [Data set]. Swedish University of Agricultural Sciences. Available at: <https://doi.org/10.5878/m5m1-br15>

Creator/Principal investigator(s)

[Isa Wallin Kihlberg](#) - Swedish University of Agricultural Sciences

Research principal

[Swedish University of Agricultural Sciences](#) - Department of Aquatic Resources

Principal's reference number

SLU.aqua.2023.4.4.IÄ-1

Description

The purpose of the study was to investigate round goby diet in two geographically distant areas in the Baltic Sea in two consecutive years, using two different methods. We collected round goby using fyke nets and gill nets in May and June 2018-2019 in Karlskrona in the southern Baltic Sea and on Åland in the northern Baltic Sea. The data set contains data of round goby diet, collected through both visual stomach content analysis (VSCA) and DNA metabarcoding. In VSCA, we dissected round goby and determined the prey items to the lowest possible taxonomic level, counted the individual prey/prey groups and estimated their relative proportions in each sample. In DNA metabarcoding, we used the 12S marker for detection of fish species in round goby diet, and the COI marker for an estimation of the proportions of fishes vs. invertebrates in the diet. DNA from round goby stomach samples was amplified using PCR and sequenced on the Illumina MiSeq platform. The output is then provided as number of sequences per prey species per sample, which roughly corresponds to relative biomass per prey species per sample. This makes it possible to compare approximate diet proportions between VSCA and DNA metabarcoding. We then analyzed round goby diet variation between areas and years for VSCA and metabarcoding (12S) separately with Redundancy analysis (RDA).

In order to investigate how round goby environmental abundances potentially influenced round goby diet, we analyzed how the fyke net catches varied between areas, years and months. The data of round goby environmental abundances was standardized for catch per unit effort (CPUE) to make comparisons possible. We then related the fyke net catches to number of prey aggregated in prey groups in round goby diet using linear mixed models (LMM) and general linear mixed models (GLMM).

To minimize the risk of drawing the wrong conclusions from the analysis of how round goby environmental abundances potentially influenced round goby diet, we also analyzed the environmental densities of various prey groups. We wanted to be as certain as possible that potential differences in round goby diet between years was in fact related to differences in e.g. round goby foraging, and not confused with potentially large variation in prey environmental differences. We got access to data of occurrences of fish fry/larvae from Karlskrona (both years) and invertebrates from Karlskrona and Åland (both years) from the Blekinge county administrative board and the Bureau of Fisheries/Husö biological station on Åland, respectively. The data of prey environmental densities was standardized for sampling effort to make comparisons possible between years. We analyzed potential differences in prey environmental abundances within areas between years with linear models.

In order to rerun the analyses, R software is required.

1. File `Diet_data_RG_no_zoopl_200520_csv_1` (for RDA and relative prey proportions in VSCA). 346 rows, 50 columns.
2. File `rg_dna_comparison_VSCA_COI_csv_1` (for visualization of fish and invertebrate proportions in

DNA (COI) and visual stomach content analysis). 17 rows, 6 columns.

3. File RG_DNA_metabarcoding_12S_2018_2019_csv_1 (for RDA and relative prey proportions in DNA metabarcoding). 109 rows, 39 columns.

4. File RG_DNA_metabarcoding_FO_csv_1 (for visualization of frequency of occurrence of fish prey in DNA metabarcoding using 12S). 85 rows, 11 columns.

5. File DNA_seq_vs_rg_catch_csv_1 (for analysis of the number of sequences from fish prey against round goby environmental abundances). 105 rows, 11 columns.

6. File VSCA_preym_abund_vs_rg_catch_csv_1 (for analysis of the number of macroinvertebrate prey in VSCA against round goby environmental abundances). 5645 rows, 12 columns.

7. File data_ttest_fish_KK_1819_csv_1 (for analysis of fish prey densities in Karlskrona in 2018 and 2019). 25 rows, 4 columns.

8. File data_ttest_BMI_KK_1819_csv_1 (for analysis of macroinvertebrate prey densities in Karlskrona in 2018 and 2019). 37 rows, 4 columns.

9. File data_ttest_BMI_AL_1819_csv_1 (for analysis of macroinvertebrate prey densities in Åland in 2018 and 2019). 49 rows, 4 columns.

10. File data_ttest_rg_median_catch_1819_rev_csv_1 (for analysis of round goby environmental abundances in Åland and Karlskrona 2018 and 2019). 20 rows, 5 columns.

The files code_fish_diet_log.txt and Rplots.pdf contain textual and graphical output of the R script code_fish_diet.R (section 7). If the script is unpacked in the same directory as the data files, they can be reproduced with the command line:

Rscript code_fish_diet.R > code_fish_diet_log.txt. The last part of the log (output of sessionInfo) is also included separately in code_fish_diet_sessionInfo.txt in part 7.

Data contains personal data

No

Language

[English](#)

Time period(s) investigated

2018-05-01 - 2018-06-30

2019-05-01 - 2019-06-30

Data format / data structure

[Numeric](#)

Species and taxons

[Neogobius melanostomus](#)

Data collection 1

- Mode of collection: Observation
- Description of the mode of collection: Fishing with fyke nets and gill nets, visual stomach content analysis and DNA metabarcoding (12S and COI markers)
- Time period(s) for data collection: 2018-05-01 – 2019-06-30
- Data collector: Swedish University of Agricultural Sciences
- Sample: Stomach content sample
Remains of prey items found in round goby stomachs
- Sample: DNA samples
Stool collection tubes with buffer solution with remains of prey items from stomach content
- Source of the data: Biological samples
- Temporal resolution: 2 year
- Spatial resolution: 515 kilometres

Geographic spread

Geographic location: [Blekinge County](#), [Åland Islands](#), [Baltic Sea](#)

Geographic description: In Blekinge the data was collected in three sampling locations outside of Karlskrona. In Åland the data was collected in Mariehamn (Västerhamn, by Elverket) and just outside Mariehamn (Lagneskär).

Responsible department/unit

Department of Aquatic Resources

Contributor(s)

Örjan Östman - Swedish University of Agricultural Sciences, Department of Aquatic Resources

Ann-Britt Florin - Swedish University of Agricultural Sciences, Department of Aquatic Resources

Karl Lundström - Swedish University of Agricultural Sciences, Department of Aquatic Resources

Funding 1

- Funding agency: Swedish Agency for Marine and Water Management
- Funding agency's reference number: Hav Dnr 3484-21
- Project name on the application: DNA-metabarcoding av diet hos den invasiva svartmunnade smörbulten

Funding 2

- Funding agency: Oscar and Lili Lamm memorial foundation
- Funding agency's reference number: FO 2017-0047
- Project name on the application: Ekologiska effekter av den invasiva fisken svartmunnad smörbult i Östersjön

Funding 3

- Funding agency: Swedish Board of Agriculture
- Funding agency's reference number: Jnr 2016-7109
- Project name on the application: Svartmunnad smörbult i Blekinge och Kalmar län: utbredning, spridning, påverkan på ekosystem och potential som resurs

Ethics Review

Uppsala - Ref. 5.8.18-07747/2018

Research area

[Ecology](#) (Standard för svensk indelning av forskningsämnen 2011)

Keywords

[Round goby](#)

Publications

Wallin Kihlberg I, Florin A-B, Lundström K, Östman Ö (2023) Detection of multiple fish species in the diet of the invasive round goby reveals new trophic interactions in the Baltic Sea. *Aquatic Invasions* 18(2): 141-162.

DOI: <https://doi.org/10.3391/ai.2023.18.2.104960>

If you have published anything based on these data, [please notify us](#) with a reference to your publication(s). If you are responsible for the catalogue entry, you can update the metadata/data description in DORIS.

Point (Lon/Lat)

19.923316, 60.112184

Point (Lon/Lat)

15.539291, 56.127467

Point (Lon/Lat)

19.920227, 60.074411

Point (Lon/Lat)

15.561949, 56.108327

Point (Lon/Lat)

15.534485, 56.158453

Accessibility level

Access to data through SND

Data are freely accessible

Use of data

[Things to consider when using data shared through SND](#)

License

[CC BY 4.0](#)

Versions

Version 1. 2023-04-28

Contact for questions about the data

Isa Wallin Kihlberg

isa.wallin@slu.se

Download metadata

[DataCite](#)

[DDI 2.5](#)

[DDI 3.3](#)

[DCAT-AP-SE 2.0](#)

[JSON-LD](#)

[PDF](#)

[Citation \(CLS\)](#)

[File overview \(CSV\)](#)

Published: 2023-04-28

Last updated: 2023-07-03